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The Mineral Industry of Madagascar

UNITED STATES DEPARTMENT OF THE INTERIOR

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The Mineral Industry of Madagascar

By Kevin Connor[1]

Commercial mineral production on the island nation remained, in order of importance, graphite, chromite, semiprecious stones, and mica. Other major mineral commodities produced, for local consumption, were cement and refined petroleum products. The mineral industry continued to produce small tonnages of a variety of industrial minerals for domestic consumption. Kraomita Malagasy, a Government parastatal, remained the only chromite producer on the island in 1987, with its sole operation at Andriamena. The state agency continued to suffer from severe technical and financial problems. QIT-Fer et Titane Inc. (QIT) of Montreal, Quebec, Canada, which signed a joint-venture agreement with the Government of Madagascar in early 1986, was continuing throughout the year with its project for the development of titanium-bearing sands along the island's southeast coastline. The Government of Madagascar spent approximately 17% of its public investment budget on the minerals sector in 1987. The Government's plans for 1988 were to double this proportion.

Government Policies and Programs.—The U.S. Trade and Development Program (USTDP) in March awarded a grant to Madagascar to further study the feasibility of a ferrochrome plant at Moramanga near the Andriamena chromite deposits and nearby Andekaleka hydroelectric dam. The estimated funding level of the grant was $400,000. Although the USTDP expressed continued interest in a proposal for platinum exploration, originally presented in 1986 to the USTDP by Madagascar's Office Militaire National pour les Industries Strategiques (OMNIS), no agreement for funding the project had been reached by yearend. The platinum proposal would involve exploration in the Andriamena area where the country's chromite mines were located. Interest in this project was also expressed by the French agency, Bureau de Recherches Géologiques et Minières (BRGM). OMNIS was hopeful of eventually forming a joint venture with a private firm to develop any commercial platinum deposits discovered.

French and U.S.S.R. funding and technical assistance in the search for precious metals continued, as did financial assistance from the International Development Agency of the World Bank, for evaluating the development potential of the Tsimiroro tar sands.

PRODUCTION AND TRADE

Madagascar's chromite production increased by more than 20% compared with 1986 levels. However, it was still only approximately one-half of the chromite ore produced annually by Kraomita Malagasy in the 1970's. Exports of chromite ore and concentrate were steady, approximately matching production levels. A total of 96,227 tons of chromite concentrates was sold at an approximate value of $4 million.[2] Graphite production and exports were steady, with export receipts estimated at $5.5 million. The total value of exports for the ornamental and semiprecious stones was estimated to be more than the mica trade, which was reported to be about $300,000 for the year. Madagascar continued to export small quantities of scrap metal, salt, abrasives, and cement. Also, as in previous years, small quantities of by-products from the country's sole petroleum refinery at Tamatave were exported to neighboring islands. Export receipts from mineral commodities produced continued to represent less than 1% of the country's gross domestic product and less than 5% of all export receipts.

Table 1.—Madagascar: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]		1983	1984	1985	1986[p]	1987[e]
METALS						
Bastnasite[e]	kilograms	25,000	25,000	9,000	10,000	10,000
Beryllium: Beryl in quartz, concentrates, industrial and ornamental		r121	46	50	e50	50
Chromium: Chromite concentrate, gross weight		45,729	59,765	127,415	82,910	3106,600
Gold, mine output, Au content[e]	troy ounces	110	130	140	130	130
INDUSTRIAL MINERALS						
Abrasives, natural, (industrial only)[e]	kilograms	7,000	10,000	10,000	10,000	10,000
Cement, hydraulic[e]		35,000	35,000	35,000	35,000	35,000
Clays, kaolin[e]		2,500	2,500	36,367	6,000	31,427
Feldspar[e]	kilograms	1,800	1,800	37,195	5,000	5,000
Gem stones:						
Amazonite	do.	8,810	6,162	5,519	e5,500	33,783
Amethyst:						
Gem	do.	15	10	11	e10	311
Geodes	do.	4,300	4,300	8,550	e9,000	9,000
Citrine	do.	12	46	372	e400	36
Cordierite	do.	27	10	762	e800	3387
Garnet	do.	1,196	2,603	1,201	e1,500	1,500
Tourmaline	do.	7	2	2	e2	2
Graphite, all grades		13,557	13,973	13,971	16,187	313,169
Mica, phlogopite:						
Block		28	26	25	e100	325
Scrap		619	623	500	e1,300	3300
Splittings and sheet		72	71	64	e194	377
Total		719	720	589	1,594	3402
Ornamental stones:						
Agate	kilograms	8,450	9,300	8,042	e8,000	314,034
Apatite	do.	3	3,500	3,500	e3,500	31,948
Aragonite		1,226	809	991	e1,000	3500
Calcite		600	1,584	1,160	e1,000	32,934
Celestine	kilograms	29,644	30,000	29,974	e30,000	34,365
Jasper	do.	17,000	16,425	16,300	e16,000	319,730
Labradorite	do.	7,847	2,740	14,821	e15,000	324,329
Other gem and ornamental[e]		125	150	200	250	250
Quartz:						
Crystal	kilograms	5,283	32,467	32,500	e32,500	32,500
Geodes	do.	3,000	2,970	3,000	e3,000	3,000
Hemotoid	do.	1,885	14,964	15,000	e15,000	36,825
Other ornamental	do.	1,200	6,397	6,500	e6,500	34,925
Rose quartz	do.	247,943	139,645	10,500	e50,000	377,980
Smelting	do.	771,000	1,058,000	1,334,000	e1,000,000	1,000,000
Tourmaline	do.	5,231	26,558	1,100	e1,000	3276
Quartz, piezoelectric	do.	51	145	150	e150	150

See footnotes at end of table.

Table 1.—Madagascar: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]		1983	1984	1985	1986[p]	1987[e]
INDUSTRIAL MINERALS —Continued						
Salt, marine[e]		30,000	30,000	30,000	30,000	30,000
Stone:						
Calcite, industrial[e]		2,000	2,000	2,000	2,000	2,000
Dimension, marble, other[e]		2,000	2,500	3,000	3,000	3,000
Marble, cipoline		100	113	35	[r]110	[r]35
MINERAL FUELS AND RELATED MATERIALS						
Petroleum refinery products:						
Distillate fuel oil	thousand 42-gallon barrels	734	129	598	[r]600	600
Gasoline	do	242	87	454	[r]450	450
Kerosene and jet fuel	do	175	49	304	[r]300	300
Other	do	13	2	30	[r]30	30
Residual fuel oil	do	1,026	142	729	[r]730	730
Total	do	2,190	409	2,115	[r]2,110	2,110

[e]Estimated [p]Preliminary [r]Revised

[1]Table includes data available through June 29, 1988.

[2]In addition to the commodities listed, modest quantities of unlisted varieties of crude construction materials (clays, sand and gravel, and stone) presumably are produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

[3]Reported figure.

Table 2.—Madagascar: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1984	1985	Destinations, 1985: United States	Destinations, 1985: Other (principal)
METALS				
Chromium:				
Ore and concentrate	26,824	27,277		China 13,793; Italy 5,549; Belgium-Luxembourg 5,498.
Oxides and hydroxides		2		All to Mauritius.
Copper: Metal including alloys:				
Scrap		13	10	NA.
Unwrought		272		All to Belgium-Luxembourg.
Semimanufactures:				
value, thousands	$13	$2		All for ship stores.
Iron and steel: Metal:				
Steel, primary forms	do	$1	$1	
Semimanufactures:				
Bars, rods, angles, shapes, sections	1	1		All for ship stores.
Universals, plates, sheets	189	126	7	Belgium-Luxembourg 8; ship stores 93.
Hoop and strip		14		West Germany 1; ship stores 13.
Wire		1		All for ship stores.
Tubes, pipes, fittings:				
value, thousands	$1	$2		Belgium-Luxembourg $1; ship stores $1.
Lead: Metal including alloys, scrap		10	10	
Tungsten: Metal including alloys, all forms	[2]	2		All for ship stores.
Zinc: Metal including alloys, semimanufactures: value, thousands	$1	$1,594		Belgium-Luxembourg $25; ship stores $1,569.
Other: Ores and concentrates		76,211		All to Japan.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice etc.: value, thousands	$8			
Artificial: Corundum	2			
Grinding and polishing wheels and stones: value, thousands	$1			
Cement		13		All to United Kingdom.
Clays, crude	486			
Graphite, natural	13,180	16,060	3,184	United Kingdom 6,530; West Germany 2,940.
Lime	127	26		United Kingdom 13; France 5.

See footnotes at end of table.

Table 2.—Madagascar: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1984	1985	Destinations, 1985: United States	Destinations, 1985: Other (principal)
INDUSTRIAL MINERALS —Continued				
Mica:				
Crude including splittings and waste	523	471	61	Belgium-Luxembourg 375; France 26.
Worked including agglomerated splittings	2	1	—	All to West Germany.
Precious and semiprecious stones other than diamond, natural: value, thousands	$643	$1,002	$363	West Germany $267; Japan $141.
Salt and brine	8,612	11,216	—	France 4,861; Reunion 412; ship stores 5,644.
Sodium compounds, n.e.s.: Carbonate, manufactured	52	4	—	All to Mauritius.
Stone, sand and gravel:				
Dimension stone: Crude and partly worked	—	9	—	All to West Germany.
Quartz and quartzite	—	523	—	West Germany 396; Mauritius 127.
Sand other than metal-bearing	1,348	110	—	All for ship stores.
Sulfur: Sulfuric acid	49	17	—	United Kingdom 12; Italy 2.
Other: Crude	385	—	—	—
MINERAL FUELS AND RELATED MATERIALS				
Coal: Anthracite	69,689	—	—	—
Petroleum refinery products:				
Gasoline, motor: 42-gallon barrels	9,444	5,542	—	Mainly for ship stores.
Kerosene and jet fuel: do.	11,160	11,749	—	Do.
Distillate fuel oil: do.	49,721	71,004	—	Do.
Lubricants: do.	728	213,423	—	Do.
Residual fuel oil: do.	35,385	81,265	—	Do.

[1]Table prepared by Virginia A. Woodson.
[2]Unreported quantity valued at $5,000.

Table 3.—Madagascar: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1984	1985	Sources, 1985: United States	Sources, 1985: Other (principal)
METALS				
Alkali and alkaline-earth metals: value, thousands	$4	—	—	—
Aluminum:				
Ore and concentrate	197	—	—	—
Oxides and hydroxides	10	9	—	All from France.
Metal including alloys:				
Scrap	34	9	—	All from Comoros.
Semimanufactures	187	311	(2)	France 269; Hong Kong 28.
Chromium: Oxides and hydroxides	5	24	24	—
Copper: Metal including alloys, semimanufactures	66	54	(2)	France 37; China 11.
Iron and steel: Metal:				
Scrap	7	—	—	—
Pig iron, cast iron, related materials	—	110	—	United Kingdom 107.
Ferroalloys: Ferromanganese	60	95	—	West Germany 75; France 20.
Semimanufactures:				
Bars, rods, angles, shapes, sections	7,610	4,754	18	France 3,400; Belgium-Luxembourg 756.
Universals, plates, sheets	11,966	9,952	23	France 8,983; Japan 287.
Hoop and strip	163	81	—	France 76.
Rails and accessories	403	2	—	Mainly from U.S.S.R.
Wire	2,276	2,014	1	France 1,672; Mauritius 309.
Tubes, pipes, fittings	5,434	970	74	France 651; Italy 143.
Lead:				
Oxides	12	10	—	France 9.
Metal including alloys:				
Scrap	—	2	—	All from France.
Unwrought	230	257	—	Do.
Semimanufactures	5	6	—	Do.
Magnesium: Metal including alloys, semimanufactures: value, thousands	$2	—	—	—

See footnotes at end of table.

Table 3.—Madagascar: Imports of mineral commodities[1] —Continued

(Metric tons, unless otherwise specified)

Commodity	1984	1985	Sources, 1985: United States	Sources, 1985: Other (principal)
METALS —Continued				
Manganese:				
Ore and concentrate, metallurgical grade		2		All from Hong Kong.
Oxides	70	90		All from West Germany.
Mercury value, thousands	$1	$7	$1	France $5.
Molybdenum: Metal including alloys, all forms	1			
Nickel: Metal including alloys, semimanufactures value, thousands	$1	$6		Mainly from France.
Platinum group metals: Metals including alloys, unwrought and partly wrought do.	$1	$1		All from France.
Silver: Metal including alloys, unwrought and partly wrought do.	$5	$1	NA	NA.
Tin: Metal including alloys, semimanufactures	4	1		Mainly from France.
Titanium: Oxides		3		Mainly from West Germany.
Tungsten: Metal including alloys, all forms	3			
Zinc:				
Ore and concentrate		445		All from China.
Metal including alloys, semimanufactures	98	25		All from France.
Other:				
Oxides and hydroxides	292	130		Do.
Base metals including alloys, all forms	9			
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc value, thousands	$10	$27		West Germany 26.
Artificial: Corundum	(4)	88		All from France.
Dust and powder of precious and semiprecious stones including diamond value, thousands		$4		Do.
Grinding and polishing wheels and stones	58	147	(4)	North Korea 127; France 17.
Asbestos, crude	70	2,099	NA	NA.
Barite and witherite value, thousands	$2			
Boron materials:				
Crude natural borates	82	75		Mainly from Belgium-Luxembourg.
Oxides and acids value, thousands	$3			
Cement	44,058	67,111	252	North Korea 31,310; U.S.S.R. 12,495; Kenya 8,717.
Clays, crude	1,071	10		China 8; France 1.
Diatomite and other infusorial earth	800	44		All from France.
Feldspar, fluorspar, related materials		72	71	NA.
Fertilizer materials:				
Crude, n.e.s. value, thousands		$1		All from China.
Manufactured:				
Ammonia	15	29		France 27.
Nitrogenous	7,050	10,063		United Kingdom 6,506; France 2,753.
Phosphatic	2,429	4,204		Belgium-Luxembourg 3,000; France 984.
Potassic	5,742	2,529	700	France 1,421; Belgium-Luxembourg 408.
Unspecified and mixed	10,288	4,396		France 3,846; Belgium-Luxembourg 500.
Graphite, natural	4			
Gypsum and plaster	2,002	5,491		France 5,490.
Lime	396	258		Belgium-Luxembourg 250.
Magnesite	44			
Mica:				
Crude including splittings and waste	2	7		All from France.
Worked including agglomerated splittings		1		All from Japan.
Pigments, mineral: Iron oxides and hydroxides, processed		18		France 17.
Precious and semiprecious stones other than diamond: Natural value, thousands	$2	$1	NA	NA.
Salt and brine do.	$36	$7		Netherlands $4; France $3.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	813	513	200	France 247; West Germany 50.
Sulfate, manufactured	2,166	2,705	16	France 1,965; West Germany 614.

See footnotes at end of table.

Table 3.—Madagascar: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1984	1985	Sources, 1985	
			United States	Other (principal)
INDUSTRIAL MINERALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked		1		All from France.
Worked	9			
Gravel and crushed rock	21			
Quartz and quartzite		3		Do.
Sand other than metal-bearing	1	3		Do.
Sulfur:				
Elemental: Crude including native and byproduct	36			
Sulfuric acid	211	173		France 127; Netherlands 25.
Talc, steatite, soapstone, pyrophyllite	17	14	12	France 2.
Other: Crude	462	319		Mainly from West Germany.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	26			
Carbon black	71	137		West Germany 74; Canada 60.
Coal: Lignite including briquets	7,318			
Coke and semicoke ... value, thousands	$1			
Peat including briquets and litter		4,303	NA	NA.
Petroleum:				
Crude ... thousand 42-gallon barrels	718	1,443		U.S.S.R. 1,069; Saudi Arabia 373.
Refinery products:				
Liquefied petroleum gas ... do	31	10		Saudi Arabia 9.
Gasoline, motor ... do	1,226	617		Qatar 420; Yemen (Aden) 148.
Mineral jelly and wax ... do	13	40		China 26; West Germany 9.
Kerosene and jet fuel ... do	323	154		Yemen (Aden) 89; Bahrain 32.
Distillate fuel oil ... do	682	392	9	Yemen (Aden) 244; Saudi Arabia 51; Bahrain 41.
Lubricants ... do	116	59	(4)	Saudi Arabia 26; Kenya 18.
Residual fuel oil ... do	68	5		All from Mozambique.
Bitumen and other residues ... do	12	1	(4)	Mainly from France.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Unreported quantity valued at $6,000.
[3]Unreported quantity valued at $4,000.
[4]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Gold.—Throughout most of the year BRGM searched for alluvial gold in the east-central rivers of Madagascar using a lightweight dredge specially designed for shallow waters. The French agency was to explore the Amabatolampy-Andravoravo and Ilea-Ambositra regions. The exploration and feasibility work was supported through financial assistance from the French Government and technical assistance from BRGM. Both of the areas under investigation were south of Antananarivo and east of Antsirabe. The areas had been mined for gold around the turn of the 19th century, with recorded production totals as high as 2,000 kilograms per year.

Titanium.—QIT of Canada continued with its plans to mine ilmenite from the Fort Dauphin area and ship it to Sorel, Quebec, Canada, where QIT's smelter at Richards Bay will process it into high-grade titanium. Early in the year, another large deposit of ilmenite was discovered on the company's concession in southeastern Madagascar. The new deposit lay beneath the already delineated 25-million-ton deposit on which mine plans were being developed. Estimated mining reserves were raised to 60 million tons, and planned initial mining capacity was raised from 300,000 to 600,000 tons per year of 60% TiO_2 concentrate.

Early in the year, a pilot-scale plant to produce heavy-mineral concentrate began operating to provide data for design and construction. The metallurgical design phase of the project was under way by

yearend, and plant design was expected to begin by mid-1988. The project schedule called for the mining operation to start by mid-1992. QIT's Richards Bay facilities were being expanded during the year to increase capacity to 1.4 million tons per year of slag. By the mid-1990's, most beach sand ilmenite consumed by the Richards Bay plant was expected to come from Madagascar. Completion of QIT's project in Madagascar was estimated to cost $500 million over a 5-year period.

INDUSTRIAL MINERALS

Madagascar continued to be an important, although small, producer of graphite. This was due to the high quality of its crystalline flake product. The majority of production was flake in 1987, with the remainder classified as fine flake. There were five producers of graphite in 1987: Société Minière de la Grande Ile, Etablissements Gallois, Etablissements R. Izouard, Société Louys, and Etablissements Rostaing. The largest producer was Etablissements Gallois, a private French operation which produced approximately one-half of the country's graphite from the Gallois Mine at Antsirakambo. The second largest producer was Société Minière de la Grande Ile, a Swedish-owned mining company, which was responsible for about one-fourth of the annual production from its mining operations at Ambatomitama.

MINERAL FUELS

During 1987, several international oil companies abandoned exploration on Madagascar. Poor results and the depressed international petroleum market were cited as reasons by the companies relinquishing their concessions.

A substantial natural gas deposit was discovered at yearend in the Manambolo area of west-central Madagascar. Estimated reserves were expected to be about 70 billion cubic feet. The Canadian Government discovered the gas deposit and also a heavy oil deposit at the same site as part of an exploration program to assist the Government of Madagascar in its search for indigenous petroleum. The natural gas deposit was the first such find in Madagascar.

The country's sole petroleum refinery at Tamatave continued to operate at below its rated capacity of 3.5 million barrels. The refinery produced an estimated 2.75 million barrels of distillates. Fuel oil, gas oil, gasoline, and kerosene were the major products of the refinery, in that order.

[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Madagascar francs (FMG) to U.S. dollars at the rate of FMG1,300 = US$1.00.

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